

NEW SPECIES OF MEXICAN *SOLIDAGO*
(COMPOSITAE: ASTEREEAE)

Guy L. Nesom

Department of Botany, University of Texas, Austin, Texas 78713 USA

ABSTRACT

Three new species and a new variety of *Solidago* are described from Nuevo León and Coahuila in NE México. *Solidago ericame-rioides* and *S. gypsophila* are apparently obligate gypsophiles with highly restricted distributions in Nuevo León and Coahuila, respectively. *Solidago hintoniorum* is known from a number of localities in the mountains of southeastern Coahuila, central Nuevo León and adjacent Tamaulipas. *Solidago wrightii* var. *orientalis* is known from a single collection from the Sierra La Marta of Coahuila and is the only collection of this species from the eastern sierra of México.

KEY WORDS: *Solidago*, Asteraceae, México, floristics.

In the preparation of a taxonomic treatment of Mexican *Solidago*, three previously undescribed taxa warrant recognition as species and another as a variety. Two of the species apparently are obligate gypsophiles and narrow endemics. The third species is relatively more widespread and known from a number of collections.

Solidago gypsophila Nesom, sp. nov. TYPE: MÉXICO. Coahuila: Mpio. Cuatro Ciénegas, ca 9 air mi SW of Cuatro Ciénegas, ca 2 mi N of Poza Becerra, in a fen-like area, with *Flaveria*, *Baccharis*, *Scirpus*, *Anemopsis*, *Sporobolus*, *Distichlis*, 709 m, 10 Oct 1976, J. Henrickson 15576 with M. Dillon (HOLOTYPE: LL!).

S. canadensis L. similis sed paginis infernis foliorum dense et grosse hispidulis laminis profunde recessis et nervaturis valde protrudentibus differt.

Herbaceous perennials 1.5-2.0 m tall, base not seen. Stems 5-7 mm thick at mid stem, yellowish, densely villous-pilose with white, crinkly hairs. Leaves erect-ascending, crowded and overlapping with internodes mostly 1 cm long, 3 veined, densely and evenly hispidulous-hirtellous on both surfaces, with deeply

recessed lamina and strongly protruding venation, oblanceolate-obovate, 8-12 mm wide, 35-75 mm long, attenuate to a petioliform base 1-2 mm long, the upper ovate to obovate, slightly reduced in size. Heads campanulate on bracteate ultimate pedicels 1-2 mm long, secund and crowded on lateral branches with narrowly elliptic bracteal leaves, the whole capitulescence a pyramid 30 cm broad at base and 35 cm high; receptacles deeply foveolate; phyllaries yellow, glabrous, with a prominently raised, resinous midvein, in 3-4 strongly graduated series, the inner 2.5-3.0 mm long. Ray flowers 7-10, the corollas 3.0-3.5 mm long, glabrous, the ligules 1.5-2.0 mm long, 0.5 mm wide, apically toothed or cleft. Disc flowers 4-5, the corollas 3.5 mm long, the lobes triangular-lanceolate, ca 1.5 mm long, the throat 1 mm long, tube 1 mm long; style appendages triangular. Achenes sparsely strigose, mature size not seen; pappus a single series of 26-32 barbellate bristles 2.5-3.0 mm long.

Additional collections examined: MÉXICO. Coahuila: Mpio. Cuatro Ciénegas, Cuatro Ciénegas Basin, small laguna between Lagunas Churince and Grande, 13 Aug 1967 [just into flower], *Cole, Minckley & Pinkava 3790* (ASU); Dos Quatos, 21 Aug 1967 [immature], *Cole, Minckley & Pinkava 4336* (ASU).

Solidago gypsophila is similar and obviously related to *S. canadensis* var. *canescens* A. Gray in its villous stem pubescence, crowded leaves, large, triangular capitulescence and the small heads with few disc flowers. The new taxon could be added to the numerous varieties of *S. canadensis*, but it differs strongly from it and all other species in its leaves with deeply recessed lamina and strongly protruding venation and in its dense, even length, stiffly hispid-hirtellous foliar pubescence.

The closest known locality for *Solidago canadensis* var. *canescens* is about 150 miles north of Cuatro Ciénegas. The widespread and commonly collected *S. velutina* DC. is the only other species of the genus that occurs close to the type locality. Typical plants of *S. velutina* have been collected from several localities in the nearby Sierra de la Madera and Sierra de la Gavia and from within the Cuatro Ciénegas basin itself ("summit - Anteojo Complex," *Meyer s.n.*, ASU), but the latter site may be a limestone outcropping rather than gypsum. *Solidago gypsophila* almost certainly is an obligate gypsophile.

***Solidago ericamerioides* Nesom, sp. nov.** TYPE: MÉXICO. Nuevo León: Mpio. Galeana, 10 km NE of Pocitos, gypsum cliff over water, 1850 m, 26 Aug 1984, *Hinton et al. 18763* (HOLOTYPE: TEX!; Isotype: ASU!, NY!).

S. missouriensi Nutt. similis sed differt statura brevioribus (6-15 cm alto), caulibus pubescentibus pilis crassis brevis, foliis brevioribus (8-20 mm longis) elliptici-oblanceolatis, capitulescentiis corymbosis capitulis paucioribus, phyllariis 3 nervatis, flosculis radii paucioribus, et acheniis longioribus.

Suffrutescent perennials 6-17 cm tall, producing basal offsets or stolons that thicken and lignify. Stems moderately to densely pubescent with thick, short, upturned hairs. Leaves apparently fleshy when fresh, wrinkling upon drying, entire, elliptic-ob lanceolate or oblanceolate-obovate, 8-20 mm long, 2-3 mm wide, not at all reduced in size upwards but the internodes lengthening to 2-4 mm, margins scabrous-ciliate, the lower surface sparsely and microscopically strigose. Heads campanulate on bracteate pedicels 3-10 mm long, in compact corymbs 2.0-3.5 mm broad of 8-20 heads each; phyllaries in 3-4 series, oblong-ob lanceolate, whitish indurated except for the prominent, orange resinous midvein, the middle series 3 veined, the inner series 4.5-5.0 mm long with minutely ciliolate margins, the outermost 1/2-1/3 as long as the rest. Ray flowers 6-10, yellow, the corollas 4-5 mm long, the ligules 2-3 mm long, 1 mm wide, 3-4 veined, with 3 shallow apical teeth, the tube glabrous. Disc flowers 6-13, the corollas ca 3.5 mm long, tubular-funnelform, the lobes lanceolate, 1.0 mm long, throat 1.5 mm long, tube 1 mm long; style appendages deltate-lanceolate. Achenes fusiform-cylindric, 2.0-2.3 mm long, densely strigose, with 5-7 raised, orange resinous nerves; pappus a single series of 29-34 barbellate bristles mostly 2-3 mm long.

Solidago ericamerioides may be closely related to *S. missouriensis* Nutt., although they are very different in a number of features. Forms of *S. missouriensis* occur in the same gypseous area as *S. ericamerioides* around Galeana, Nuevo León, but even in a highly gypseous substrate, plants of *S. missouriensis* maintain a general morphology relatively typical of the species in its main range in the United States. The two species (in México) are distinguished by the following couplet.

1. Plants 6-17 cm tall with thick-hairy stems; leaves 8-20 mm long, elliptic-ob lanceolate; capitulescence corymbose, distinctly flat topped, few headed; phyllaries of nearly equal length, the middle 3 veined; ray flowers 6-10; achenes 2.0-2.3 mm long *S. ericamerioides*
1. Plants 50-100 cm tall with glabrous to glabrate stems; leaves 40-90(-110) mm long, linear-lanceolate; capitulescence cylindric to oval or pyramidal with numerous heads; phyllaries strongly graduated in length, the middle 1 veined; ray flowers 13-18; achenes 1.0-1.5 mm long *S. missouriensis*

Typical plants of *Solidago missouriensis* have been collected on gypsum very near the type locality of *S. ericamerioides* (Hinton et al. 18780, TEX). This sheet appears to be a mixed collection, bearing six typical plants of *S. missouriensis* and one small plant that has the habit and capitulescence of *S. ericamerioides*, but longer leaves and strongly graduated phyllaries. I believe this individual may represent a hybrid or introgressant.

Collections of the following undescribed species have been accumulating at TEX-LL for some time, identified as *Solidago muelleri* Standley, which however, has proved to be a synonym of *S. missouriensis* Nutt.

***Solidago hintoniorum* Nesom, sp. nov.** TYPE: MÉXICO. Nuevo León: Mpio. Galeana, Cerro El Potosí, clearing in pine forest, 3150 m, 15 Sep 1969, *Hinton et al. 17264* (HOLOTYPE: TEX!).

S. petiolari Ait. similis sed caulibus et foliis sparsim villosis, phyllariis eglandulosis glabris 3 nervatis marginibus hyalinis, et acheniis strigosis differt.

Rhizomatous perennials. Stems 0.5-1.0 m tall, sparsely hairy with spreading crisped hairs mostly 0.5-1.0 mm long, eglandular. Leaves entire to serrate with 3-6(-9) teeth, obovate to obovate-oblongate, the basal often persistent, basally attenuate to a broad petiolar region, lower to midcauline 5-9 cm long, 10-25(-35) mm wide, little reduced upwards but becoming sessile, eglandular, margins spreading ciliate, the major veins usually sparsely villous, the lamina glabrous to sparsely villous. Heads 5-6 mm wide, sessile to subsessile on ultimate peduncles 1-2 mm long, in tightly cylindrical panicles mostly 6-15 cm long, the capitulescence sometimes branched and producing lateral ascending cylinders below the primary one; phyllaries oblong with erect, rounded to obtuse apices, with a prominent, green apical patch with numerous visible stomates, glabrous or with a few, minute hairs near the apex, strongly graduated in 3-4 series with the inner 5-6 mm long, midvein thick and orange resinous, often flanked by 1-2 pairs of smaller, lateral veins on the middle and inner, margins with broad, hyaline flanges, sometimes slightly lacerate-ciliate near the apex. Ray flowers 5-10, the corollas 5.5-6.0 mm long, ligules 2.5-3.5 mm long, 0.8-1.3 mm wide. Disc flowers (6-)8-11, the corollas 5.0-5.5 mm long. Achenes moderately strigose, cylindric, mature size not observed; pappus of 25-36 barbellate bristles.

Additional collections examined: MÉXICO. Coahuila: Mpio. Arteaga: Sierra La Marta, with *Pinus*, *Ceanothus*, *Quercus* and *Garrya*, 24 Oct 1981, *Poole 2449* (TEX); Sierra Los Camargos, bushy hillside, 2920 m, 19 Jul 1980, *Hinton et al. 17884* (TEX); Sierra Los Camargos, 2870 m, 4 Aug 1980, *Hinton et al. 17925* (ASU); Sierra La Viga, N side, with *Pinus*, *Pseudotsuga*, *Abies* and *Picea*, 2700-3000 m, 24 Oct 1984, *McDonald & Gomez 1179* (TEX); Sierra La Viga, SE side, *Pinus culminicola* and *P. hartwegii*, 3300 m, 25 Oct 1984, *McDonald & Gomez 1216* (TEX); Sierra de Arteaga, Las Vigas, cañon de la Carbonera, *Pinus*, *Pseudotsuga*, *Abies*, *Quercus* and *Ceanothus*, 2100-2600 m, 15 Sep 1988, *Villarreal et al. 4590* (TEX). Nuevo León: Mpio. Galeana: Sierra La Marta, rocky mountainside, 2870 m, 4 Aug 1980, *Hinton et al. 17925* (TEX); Sierra La Marta, rocky mountain, 2800 m, 6 Sep 1981, *Hinton et al. 18335* (TEX); El Carrizo, oak woods, 1900 m, 16 Oct 1983, *Hinton et al.*

18619 (TEX, WAT); Dulces Nombres, open rocky places, 2000 m, 12 Aug 1948, Meyer & Rogers 2955 (MO); W of Galeana, 7.5 mi SW of Dieciocho de Marzo along the road to the top of Cerro Potosí, pine and fir forest with shrubby oaks, 12 Oct 1984, Sundberg 3114 (TEX). Tamaulipas: 3-5 km S of Huisachal, limestone slopes, ca 6000 ft, 27 Jun 1949, Stanford et al. 2096 (SMU, TEX).

The Tamaulipan collections have strongly reduced upper cauline leaves but are otherwise typical of *Solidago hintoniorum*. They are perhaps hybrids between *S. hintoniorum* and *S. simplex*. Plants of another collection (Meyer & Rogers 2955) may also be hybrids between the same two species. I have tentatively identified them as *S. simplex*, however, because they have the reduced habit, purplish stems, and weakly 3 nerved leaves of that species, but in vestiture they are much more similar to *S. hintoniorum*. The long ciliate petioles of *S. hintoniorum* are distinctive from both of the putative hybrids. Both *S. simplex* and *S. hintoniorum* have a cylindrical capitulescence, mostly 1 nerved, obovate (lower) leaves and glabrous, oblong phyllaries with rounded apices.

Solidago hintoniorum is similar to *S. petiolaris* and *S. wrightii* in its 1 nerved leaves, which are relatively unreduced upwards and its large, prominent ray flowers. With *S. petiolaris* it shares a cylindric capitulescence and with *S. wrightii* strigose achenes. It is different from both species in its glabrous phyllaries and completely non glandular, sparsely villous vestiture.

Solidago wrightii and *S. petiolaris* appear to be more similar to each other than either is to *S. hintoniorum*, although the three clearly form a closely related group. In fact, the first two are so similar they perhaps should be treated as a western and eastern phase of a single species. They are distinguished by capitular features and achene vestiture, as in the key below, but intergradient population systems occur in southwest Texas, where their geographic ranges meet. A review of the taxonomy of the whole group is in progress (Nesom, in prep.).

The following key identifies the Mexican taxa of *Solidago* that have 1 nerved leaves, not or only slightly reduced in size upwards, and heads in corymbs or cylindrical panicles, not at all secund. The geographic ranges are only for México.

1. Phyllaries (1-)3(-5) veined, glabrous, eglandular; capitulescence cylindrical; stems and leaves sparsely villous with spreading crisped hairs 0.5-1.0 mm long; southeast Coahuila to central Nuevo León and adjacent Tamaulipas *S. hintonii*
1. Phyllaries 1 veined, hairy, glandular, or both; capitulescence cylindrical to corymbose; stems and leaves stipitate glandular or merely hairy, but if the latter the hairs mostly 0.1-0.2 mm high (2)
2. Capitulescence a terminal corymb usually as wide as long or an open,

paniculate cluster of similar corymbs; achenes obviously strigose;
Chihuahua to central Durango and southwest to east central

Coahuila *S. wrightii*

2. Capitulescence a tightly cylindric panicle; achenes glabrous or nearly so; N Coahuila and central Nuevo León *S. petiolaris*

A collection from mountains of Coahuila east of Saltillo is related to *Solidago wrightii* and deserves recognition at the varietal level.

***Solidago wrightii* var. *orientalis* Nesom, var. nov. TYPE: MÉXICO.**

Coahuila: Mpio. Arteaga, Sierra La Marta, pine and spruce woods, 3100 m, 6 Sep 1981, *Hinton et al. 18333* (HOLOTYPE: TEX!; Isotype: NY!, TEX!).

Varietatis aliis *S. wrightii* A. Gray similis sed marginibus foliorum serrat-crenatis dentibus 5-10(-14) imprimis differt.

Perennials, base not seen. Stems 0.5-0.6 m tall, puberulous with a mixture of stipitate glands and short, spreading, upturned hairs ca 0.2 mm high. Leaves thick, elliptic to elliptic obovate, 35-75 mm long, 15-25 mm wide, serrate with 5-10(-14) pairs of teeth, the lamina hirtellous and stipitate glandular. Heads sessile to subsessile on ultimate peduncles 1-3 mm long, in compact, terminal corymbs; phyllaries thick, oblong to lanceolate oblong, often with spreading-reflexing apices, with the inner often strongly convex, graduated in 3-4 series, the innermost 5-6 mm long. Ray flowers 4-6. Disc flowers 9-12. Achenes sparsely strigose.

The plants of this collection have a corymbose capitulescence and densely stipitate glandular upper stems, leaves and phyllaries. Leaves of plants from elsewhere in the range of *Solidago wrightii* are entire but they very rarely produce 1 or 2 pairs of small teeth. The prominently toothed leaves of var. *orientalis* may reflect genetic input from *S. petiolaris*, which is known from several areas in the eastern Sierra and has similarly toothed leaves in the area where *S. wrightii* occurs. The plants of var. *orientalis* are the only ones of the species known from the eastern Sierra Madre, but *S. wrightii* has been collected from the Sierra de Jimulco of southwestern Coahuila, and the species may have migrated eastward across Coahuila. In qualification, however, the number of ray flowers of var. *orientalis* (4-6) is more similar to that of plants of *S. wrightii* in New Mexico (6-11) than in the western Sierra of México (9-14).

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